

Answer the following questions:

**Q-1) Choose the correct answers:**

**(8 marks)**

**1- The dimensions of force is**

$$[LT - MLT - MLT^2].$$

**2- The dimensions of velocity is**

$$[LT - LT^1 - MLT^2].$$

**3- The dimensions of acceleration is**

$$[LT^2 - MLT - MLT^2].$$

**4- The density of the material is defined as**

$$\left[ \frac{\text{Mass}}{\text{Volume}} - \frac{\text{Force}}{\text{Velocity}} - \frac{\text{Acceleration}}{\text{Volume}} \right].$$

**5- The pressure is defined as**

$$\left[ \frac{\text{Force}}{\text{Length}} - \frac{\text{Force}}{\text{Velocity}} - \frac{\text{Force}}{\text{Area}} \right]$$

**6- The Young modulus is defined as**

$$\left[ \frac{\text{Shear Stress}}{\text{Shear Strain}} - \frac{\text{Long. Stress}}{\text{Long. Strain}} - \frac{\text{Volum. Stress}}{\text{Volum. Strain}} \right]$$

**7- The tensile strain is defined as**

$$\left[ \frac{\Delta V}{V} - \frac{\Delta \ell}{L} - \frac{\Delta \theta}{\theta} \right]$$

**8- The volume stress is defined as**

$$\left[ \frac{F_{\perp}}{A} - \frac{\Delta \ell}{L} - \frac{F_{\parallel}}{A} \right]$$

**Q-2) Using the theory of dimensions, prove that the following equation is dimensionally correct; (2 marks)**

$$v_f^2 = v_i^2 + 2ax$$

**Where  $v_f$  is the final velocity,  $v_i$  is the initial velocity,  $a$  is the acceleration, and  $x$  is the displacement.**

**Q-3) 1. Find the unit of  $d$  (in CGS) in the following relation, (2 marks)**

$$V_2^2 = V_1^2 + 2dX$$

**Where  $V$  is the velocity and  $X$  is the displacement.**

Q-4) A wire of length 120cm and diameter 0.82mm, supported from one end, A 5.3kg in the other end . Find : (3 marks)

a) The stress in the wire

b) The strain in the wire

c) The strain energy ‘ where  $Y = 1.2 \times 10^{12}$  dyne/cm<sup>2</sup> and  $g = 980$ cm/sec<sup>2</sup>